

**What is claimed is:**

- 1        1.    A preparation method for biochips, comprising:  
2        (a) providing a substrate;  
3        (b) applying a micro-injecting process to spray a  
4        hydrophobic material on the substrate for forming  
5        a hydrophobic region thereon, and a plurality of  
6        partitions being defined on the hydrophobic  
7        region; and  
8        (c) immobilizing a probe on each partition by the  
9        micro-injecting process.
- 1        2.    The preparation method as claimed in claim 1,  
2        wherein the hydrophobic material is selected from a group  
3        consisting of Teflon, polyimide, fluoro-compound, and  
4        silicon compound.
- 1        3.    The preparation method as claimed in claim 1,  
2        wherein the micro-injecting process is performed by a micro-  
3        injector to spray vertically, horizontally, unidirectionally  
4        or bidirectionally.
- 1        4.    The preparation method as claimed in claim 3,  
2        wherein the micro-injector is selected from a group  
3        consisting of a thermal bubble micro-injector and a piezo  
4        micro-injector.
- 1        5.    The preparation method as claimed in claim 1,  
2        wherein the substrate is a hydrophobic substrate and is  
3        selected from a group consisting of glass, silica, quartz,  
4        mica, ceramics, and metals.

1        6. The preparation method as claimed in claim 5,  
2 further comprising a step (d), after the step (b), for  
3 forming a hydrophilic functional group on each partition.

1        7. The preparation method as claimed in claim 6,  
2 wherein the hydrophilic functional group is selected from a  
3 group consisting of -NH<sub>2</sub>, -COOH, -SH, epoxide, aldehyde, and  
4 streptavidin.

1        8. The preparation method as claimed in claim 1,  
2 wherein the substrate is a hydrophilic substrate selected  
3 from a group consisting of polystyrene, polyester,  
4 polycarbonate, polyvinylchloride, polyethylene,  
5 polypropylene, polysulfone, polyurethane, and  
6 polymethylmethacrylate (PMMA).

1        9. The preparation method as claimed in claim 8,  
2 further comprising:  
3        a step (e), after the step (a), hydrophobically  
4        treating the substrate; and  
5        a step (f), after the step (b), hydrophilically  
6        treating each partition to form a hydrophilic  
7        functional group thereto.

1        10. The preparation method as claimed in claim 9,  
2 wherein the hydrophilic functional group is selected from a  
3 group consisting of -NH<sub>2</sub>, -COOH, -SH, epoxide, aldehyde, and  
4 streptavidin.

1        11. The preparation method as claimed in claim 1,  
2 wherein the partitions are selected from a group consisting  
3 of square, circular, and geometric figures.

1        12. The preparation method as claimed in claim 1,  
2 wherein the probe is selected from a group consisting of  
3 DNA, RNA, nucleotides, oligonucleotides, protein,  
4 antibodies, and peptides.

1        13. The preparation method as claimed in claim 1, wherein  
2 the probe is immobilized to each partition by a binding  
3 process.

1        14. The preparation method as claimed in claim 13,  
2 wherein the binding process is selected from a group  
3 consisting of adsorption, covalent binding, encapsulation,  
4 cross-linking, and entrapment.

1        15. The preparation method as claimed in claim 1,  
2 wherein the micro injecting process is performed by a  
3 thermal micro-injector, and the micro-injector comprises:

- 4            a chamber for storing a fluid;
- 5            a micro injecting process pore disposed on the
- 6            chamber for ejecting the fluid;
- 7            a first heater and a second heater arranged on
- 8            two sides of the micro injecting process
- 9            pore respectively;

10        when the chamber is full of the fluid, the first heater  
11            produces a first bubble and the second heater  
12            produces a second bubble, and the two bubbles  
13            spray out a drop of the fluid.

1        16. The preparation method as claimed in claim 15,  
2 wherein the first and the second heaters are triggered by  
3 one signal.

1        17. The preparation method as claimed in claim 15,  
2 wherein the first bubble acts as a valve to limit an  
3 ejection of the fluid in the chamber.

1        18. A biochip, comprising:  
2 a substrate,  
3 a plurality of hydrophobic regions formed on the  
4 substrate by micro-injecting a hydrophobic  
5 material on the substrate;  
6 a plurality of hydrophilic partitions separated by the  
7 hydrophobic regions disposed on the substrate;  
8 and  
9 a probe immobilized on each partition by a micro-  
10 injecting process.

1        19. The biochip as claimed in claim 18, wherein the  
2 substrate is a hydrophobic substrate selected from a group  
3 consisting of glass, silicon, quartz, mica, ceramics, and  
4 metals.

1        20. The biochip as claimed in claim 19, wherein the  
2 surface of the hydrophobic substrate contains a hydrophilic  
3 functional group after a hydrophilic treating.

1        21. The biochip as claimed in claim 20, wherein the  
2 hydrophilic functional group is selected from a group

3 consisting of -NH<sub>2</sub>, -COOH, -SH, epoxide, aldehyde, and  
4 streptavidin.

1 22. The biochip as claimed in claim 21, wherein the  
2 substrate is a hydrophilic substrate selected from a group  
3 consisting of polystyrene, polyester, polycarbonate,  
4 polyvinylchloride, polyethylene, polypropylene, polysulfone,  
5 polyurethane, and polymethylmethacrylate (PMMA).

1 23. The biochip as claimed in claim 20, wherein the  
2 substrate becomes hydrophobically because of a hydrophobic  
3 treatment performed on the substrate before the plurality of  
4 the partitions are formed.

1 24. The biochip as claimed in claim 23, wherein a  
2 hydrophilic treatment is performed on the partitions to add  
3 a hydrophilic functional group thereto after the partitions  
4 are formed.

1 25. The biochip as claimed in claim 24, wherein the  
2 hydrophilic functional group is selected from a group  
3 consisting of -NH<sub>2</sub>, -COOH, -SH, epoxide, aldehyde, and  
4 streptavidin.

1 26. The biochip as claimed in claim 18, wherein the  
2 hydrophobic material is selected from a group consisting of  
3 Teflon, polyimide, compounds containing fluorides and  
4 silicides.

1 27. The biochip as claimed in claim 18, wherein the  
2 probe is selected from a group consisting of DNA, RNA,

3 nucleotides, oligonucleotides, protein, antibodies, and  
4 peptides.

1 28. The biochip as claimed in claim 18, wherein the  
2 probe is immobilized on the partition by a process selected  
3 from a group consisting of adsorption, covalent binding,  
4 encapsulation, cross-linking, and entrapment.